What is claimed is:

1. A method for automatically optimizing an FTMS variable, comprising:

for a plurality of FTMS samples each having a substantially similar number of molecules, repeatedly and automatically:

obtaining a plurality of data sets, each data set from the plurality of data sets obtained by:

applying a trapping plate voltage to at least one trapping plate of an FTMS cell; and

measuring a composite amplitude of an FTMS spectral output signal;

for the plurality of data sets, determining a variance for the composite amplitude; and

changing an FTMS variable;

until the variance is substantially minimized.

2. A method for automatically optimizing an FTMS variable, comprising:

for a plurality of FTMS samples each having a substantially similar number of molecules, repeatedly and automatically:

obtaining a plurality of data sets, each data set from the plurality of data sets obtained by:

applying a trapping plate voltage to at least one trapping plate of an FTMS cell; and

measuring a composite amplitude of an FTMS spectral output signal; and

changing an FTMS variable;

until the composite amplitude is substantially maximized.

3. A method comprising a plurality of activities comprising:

automatically and repeatedly:

changing an ionizing current flux applied to an FTMS sample; and

determining if a composite amplitude of an FTMS spectral output signal changes approximately linearly in response to said changing activity;

until a maximum linearly-responsive ionizing current flux is found.

4. A method for automatically optimizing an FTMS variable, comprising:

automatically and repeatedly:

obtaining a composite amplitude relating to an FTMS spectral output signal for each of a plurality of FTMS samples, each of the samples having an substantially similar number of molecules;

determining a value of an optimization parameter, the optimization parameter a function of the composite amplitude;

changing an FTMS variable;

until the value of the optimization parameter substantially converges on a convergence target.

5. The method of claim 4, further comprising receiving a count of the plurality of FTMS samples.

6. The method of claim 4, further comprising receiving a user-chosen identification of a count of the plurality of FTMS samples.

7. The method of claim 4, further comprising obtaining one or more factors for computing the composite amplitude.

8. The method of claim 4, further comprising obtaining an optimization parameter.

9. The method of claim 4, further comprising obtaining a convergence target.

10. The method of claim 4, further comprising, for each of a plurality of ion species present in each sample, determining a count of the ion species.

11. The method of claim 4, further comprising, for each of a plurality of ion species present in each sample, determining an amount of the ion species.

12. The method of claim 4, further comprising, for each of a plurality of ion species present in each sample, determining a relative amount of the ion species.

13. The method of claim 4, further comprising receiving an amount of the substantially similar number of molecules.

14. The method of claim 4, further comprising receiving a user-chosen valve setting corresponding to the substantially similar number of molecules for each of the FTMS samples.

15. The method of claim 4, further comprising receiving a user-chosen starting ionizing current flux.

16. The method of claim 4, further comprising introducing an FTMS sample from the plurality of FTMS samples into an FTMS cell.

17. The method of claim 4, further comprising applying a trapping plate voltage to at least one trapping plate of an FTMS cell.

18. The method of claim 4, further comprising determining an initial number of charges formed in an FTMS cell.

19. The method of claim 4, further comprising measuring an initial number of charges formed in an FTMS cell.

20. The method of claim 4, further comprising acquiring an FTMS output signal.

21. The method of claim 4, further comprising transforming an FTMS time domain output signal to the FTMS spectral output signal.

22. The method of claim 4, further comprising measuring the composite amplitude.

23. The method of claim 4, further comprising calculating the composite amplitude.

24. The method of claim 4, further comprising combining each of a plurality of ion-specific FTMS spectral amplitudes to form the composite amplitude.

25. The method of claim 4, further comprising summing each of a plurality of ion-specific FTMS spectral amplitudes to form the composite amplitude.

26. The method of claim 4, further comprising calculating the value of the optimization parameter.

27. The method of claim 4, further comprising comparing a first value for the optimization parameter to a second value for the optimization parameter.

28. The method of claim 4, further comprising increasing the FTMS variable.

29. The method of claim 4, further comprising decreasing the FTMS variable.

30. The method of claim 4, wherein the FTMS variable is an ionizing current flux.

31. The method of claim 4, wherein the FTMS variable is a trapping plate voltage.

32. The method of claim 4, wherein the FTMS variable is an ionizing stage trapping plate voltage.

33. The method of claim 4, wherein the FTMS variable is a detection stage trapping plate voltage.

34. The method of claim 4, wherein the FTMS variable is an ion location in an FTMS cell.

35. The method of claim 4, wherein the FTMS variable is a pre-detection ion location in an FTMS cell.

36. The method of claim 4, wherein the optimization parameter is the composite amplitude.

37. The method of claim 4, wherein the optimization parameter is a variance of the composite amplitude.

38. The method of claim 4, wherein the optimization parameter is a function of the composite amplitude.

39. A machine-readable medium containing instructions for activities comprising:

automatically and repeatedly:

obtaining a composite amplitude relating to an FTMS spectral output signal corresponding to a plurality of FTMS samples, each of the samples having an substantially similar number of molecules;

determining a value of an optimization parameter, the optimization parameter a function of the composite amplitude;

changing an FTMS variable;

until the value of the optimization parameter substantially converges on a convergence target.